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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

BER2094 – ENVIRONMENTAL & RESOURCE ECONOMICS (All Section/Group)

20 October 2016
9.00am – 11.00am
(2 Hours)

INSTRUCTION TO STUDENT

1. This question paper consists of **FOUR (4)** pages including cover page with Section A and B.
2. Section A consists of **One (1)** Case Study. Section B consists of **Three (3)** Structured Questions.
3. Attempt **ALL** questions.
4. Please write all the answers in the answer booklet provided.
5. The marks distribution for each question is given. Total mark is 100.

SECTION A: CASE STUDY (40%)

Threats to rivers

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Major threats to our rivers...

In our nation building pursuits, rivers have been utilised to fulfil various development needs, altering the natural conditions and dynamics of rivers, and the land use in river basins. Damage to river systems, degradation of their quality and ability to perform important functions bring about major consequences, leading to long-term economic losses and affecting the population's quality of life as a whole.

The way we use and manage rivers can cause great environmental damage that adversely affects resources that we depend on for our well-being and survival. Undeniably, most threats to rivers are the direct result of our own activities.

River Pollution

Pollution is one the largest threats to our rivers. The reduction in river water quality is a clear indicator of the decline in the environmental health of a river basin. The sources of pollution come from domestic and industrial sewerage, effluents from livestock farms, manufacturing and agro-based industries, suspended solids from mining, housing and road construction, logging and clearing of forest and heavy metals from factories. Urbanisation significantly contributes to the increase in water pollution problems, especially in the form of sedimentation, solid waste, rubbish, and organic pollution. Urban development usually removes forests within a basin that results in soil erosion and sedimentation. Inefficient waste disposal systems and lack of proper sanitation facilities lead to waste and sewage ending up in rivers.

Rivers contaminated by sewage contain high levels of organic pollutants, and they become breeding grounds for harmful bacteria and viruses that may cause either mass die-offs or reduced resistance to diseases and loss of reproductive ability of fish and other aquatic organisms. Sewage pollution also causes outbreaks of water borne diseases such as cholera, typhoid and hepatitis A that are detrimental to human. Pollutants such as heavy metals, pesticides and herbicides pose health hazards to human beings and aquatic life. Consumption of fish, prawn or cockles that have accumulated heavy metal pollutants result in disturbed reproduction rates and life spans. Pesticide and herbicide contamination may lead to death or chronic long-term illness in humans as well as impair the fertility and development of both humans and aquatic fauna.

Physical Alteration of River Systems

Infrastructure projects implemented in river basins for the purpose of flood control, storage of water or to generate power, such as dams, normally involve channelisation of rivers

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running through urban areas, river diversion, deepening, straightening and widening, and clearing of riparian vegetation. These activities cause shifts in flow regimes, changes in river water chemistry and processes, and sediment deposition resulting in alteration of the natural river ecology and hydrology. Normally, the aquatic life is the most significantly and directly affected.

Destruction of Highland Catchment Areas

The highlands are important water catchments that are major sources of our water supply. Although forests still form the largest single land use in our highlands, there is increasing interest towards highland development. Disturbances involving vegetation clearing, especially on the unstable and sensitive steep slopes, will result in soil erosion and sometimes landslides. The types of land use in the highland catchment which impact most significantly on rivers and riverine wetlands are forestry (i.e. timber extraction), agriculture, mining, industry and urbanisation.

Over Exploitation of Fisheries Resources

Excessive harvesting and using destructive and illegal fishing practices and methods, such as derris roots, poisons, explosives, small mesh nets and fish traps, can lead to the reduction in population of most fish species.

Introduction of Exotic Species into Riverine Environment

Introduction of exotic species into the riverine environment, either intentionally or accidentally, for food fish and aquarium trade, is a major issue particularly from the perspective of indigenous freshwater species conservation. Once introduced to a suitable aquatic environment, the exotic fauna and flora can potentially breed excessively and cause displacement of the indigenous populations.

Based on the above article, answer the following questions:

- a) List and explain any **THREE (3)** major threats to Malaysia's rivers. (12 marks)
- b) List out **SIX (6)** main parameters computed in Water Quality Index (WQI) Malaysia. (6 marks)
- c) Recommend any **TWO (2)** actions need to be strictly implemented by the government to combat water pollution. (10 marks)
- d) Based on your understanding on market-based approaches, choose a suitable market-based approach for the decision makers to reduce water pollution in Malaysia. Discuss and assess with suitable modeling. (12 marks)

SECTION B: STRUCTURED QUESTIONS (60%)**QUESTION 1 (20 marks)**

- a) Define environmental risk. Explain the **TWO (2)** key factors that caused the environmental risk. (10 marks)
- b) Discuss any **FOUR (4)** impacts of global food insecurity. (10 marks)

QUESTION 2 (20 marks)

- a) A plastic manufacturing plant is releasing endocrine-disrupting chemicals into the air, and these emissions are associated with the development of breast cancer among the women who are working in the plant. Economists have estimated the following marginal costs and benefits for the plastic market, where Q is monthly output in thousands of pounds and P is price per pound.

$$MSB = 50 - 0.4Q$$

$$MSC = 2 + 0.4Q$$

$$MEB = 0$$

$$MEC = 0.2Q$$

- i) Calculate the price (P_c) and quantity (Q_c) in the competitive equilibrium. (6 marks)
- ii) Calculate the price (P_e) and quantity (Q_e) in the efficient equilibrium. (4 marks)
- b) Plant Y and Plant Z are the two major electricity production plants in Country A. The two plants are facing the following marginal abatement costs (MAC) for greenhouse gases.

$$MAC_Y = 1.2A_Y$$

$$MAC_Z = 1.8A_Z$$

A_Y represents the quantity of abatement for Plant Y and A_Z represents the quantity of abatement for Plant Z. In average, the two plants do not hold enough greenhouse gases allowances to cover their production activities and must abate a combined level of 20 units. Should each firm abate 10 units each? Explain your answer with MAC justification and show all your calculations to support your answer. (10 marks)

QUESTION 3 (20 marks)

- a) What is ozone depletion? How does it affect the earth? List the **TWO (2)** primary ozone depleters. (10 marks)
- b) Define municipal solid waste. List and explain any **TWO (2)** risks of municipal solid waste. (10 marks)

End of Paper